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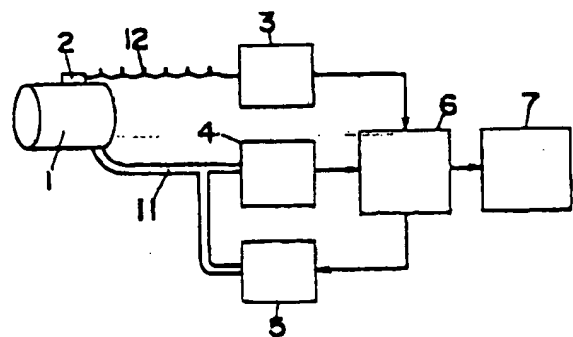
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(54)【発明の名称】 血圧計

(57)【要約】

【目的】 体動に伴う腕の小さな振動やゆっくりした腕の上下動が発生した場合にこれを検知して報知する。

【構成】 人体の腕部をカフ帯1により圧迫・阻血して動脈音及び動脈脈動を検出することで血圧を決定する血圧計である。カフ帯1に体動を検知するための加速度センサー2を設置する。加速度センサー2により検知した体動を報知する報知手段7を設ける。加速度センサー2で体動を検知して報知手段7により体動を報知する。



1 カフ帯
2 加速度センサー
7 報知手段

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【特許請求の範囲】

【請求項1】 人体の要部をカフ帯により圧迫・阻血して動脈音及び動脈脈動を検出することで血圧を決定する血圧計において、カフ帯に体動を検知するための加速度センサーを設置し、加速度センサーにより検知した体動を報知する報知手段を設けて成ることを特徴とする血圧計。

【請求項2】 体動検知により検知された体動変位量に応じて血圧測定を中断または再測定する手段を設けて成ることを特徴とする請求項1記載の血圧計。

【請求項3】 カフ帯に表示手段を設置し、血圧値、脈動値に加えて体動検知を報知する手段を設けて成ることを特徴とする請求項1記載の血圧計。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は、血圧計の体動検知に関するものである。

【0002】

【従来の技術】従来の血圧計では体動、特に腕の大きな動作に伴うカフ圧力変化があった場合に、図7に示すように、カフ圧力の変動を異常と判断して血圧測定中に異常を知らせたり、測定を中断したりしていた。しかし、比較的小さな体動の場合にカフ圧力の変化は少なく、測定誤差を生じることがあった。また、図6に示すように、比較的ゆっくりとした腕の上下がある場合でもカフ圧力の変化は少なく、異常を知らせることができなかった。また、腕の上下により腕と心臓14との高さの差が生じ、水頭圧差により腕の血圧が心臓の血圧と異なってくる。

【0003】

【発明が解決しようとする課題】上記のように従来にあっては、体動に伴う腕の小さな振動やゆっくりとした腕の上下動が発生した場合には従来の血圧計ではそれを検知する手段がなかった。本発明は上記の従来例の問題点に鑑みて発明したものであって、その目的とするところは体動に伴う腕の小さな振動やゆっくりとした腕の上下動が発生した場合にこれを検知して報知することができ、また、正確な血圧測定ができる血圧計を提供するにある。

【0004】

【課題を解決するための手段】上記した従来例の問題点を解決して本発明の目的を達成するために、本発明の血圧計は、人体の要部をカフ帯1により圧迫・阻血して動脈音及び動脈脈動を検出することで血圧を決定する血圧計において、カフ帯1に体動を検知するための加速度センサー2を設置し、加速度センサー2により検知した体動を報知する報知手段7を設けて成ることを特徴とするものである。

【0005】また、体動検知により検知された体動変位量に応じて血圧測定を中断または再測定する手段を設けることが好ましい。更に、カフ帯1に表示手段15を設

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置し、血圧値、脈動値に加えて体動検知を報知する手段13を設けることも好ましい。

【0006】

【作用】本発明によれば、上記のようにカフ帯1に体動を検知するための加速度センサー2を設置し、加速度センサー2により検知した体動を報知する報知手段7を設けることで、体動に伴う腕の小さな振動やゆっくりとした腕の上下が発生してもこれを加速度センサー2により検知して報知手段7により報知することで、体動に伴う腕の小さな振動やゆっくりとした腕の上下が発生したことを確認でき、これらの動きを確認できないまま不正確な血圧測定を行うのを防止することができるようになったものである。

【0007】また、体動検知により検知された体動変位量に応じて血圧測定を中断または再測定する手段を設けると、体動による不正確な血圧測定を無くし、再測定又は不正確な測定の中断ができるようになったものである。また、カフ帯1に表示手段15を設置し、血圧値、脈動値に加えて体動検知を報知する手段13を設けると、体動があった場合に、それを報知する部分が血圧値、脈動値の表示部分であるため、測定中における体動を確認しやすく、正確な測定がしやすくなったものである。

【0008】

【実施例】以下本発明を添付図面に示す実施例に基づいて詳述する。図1には本発明の一実施例を示すブロック図である。本発明の血圧計は人体の要部をカフ帯1により圧迫・阻血して動脈音及び動脈脈動を検出することで血圧を決定するようになっている。カフ帯1の上には体動を検知するための加速度センサー2が設置してあり、アンプ3により電圧変換して制御部6に入力するようになっている。また、加速度の大きさにしたがって制御部6から報知手段7（例えばブザー）を制御して報知するようになっている。図1において1はエアパイプ、4は圧力変換回路、5はカフ帯加減圧機構である。

【0009】図2、図3には加速度センサー2の例が示してあり、図2には加速度センサー2の例が示してあり、図2に示すものは圧電素子10の上に重り9を配設したものであり、図3に示すものは板状の圧電素子10の先端に重り9を配設したものであり、図2のように圧電素子10の圧縮、伸張や図3のように圧電素子10の撓みによりケーブル12に加速度電位が発生するようになっている。なお、速度、変位は加速度をそれぞれ一次積分、二次積分したものであって、変換可能であるし、また、体動を加速度だけで見てもよい。

【0010】図4には本発明の他の実施例が示してある。この実施例においては、図4の不ロー図に示すように、振動発生時の振動レベル（加速度）にしたがって振動を報知したり、振動レベルが大きい場合には再測定したり、測定中断を判定するようになっている。すなわ

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ち、図1、図4において加速度センサー2で体動を検出するのであるが、体動による振動が発生した場合、加速度センサー2で検出した加速度電位がアンプ3を経て制御部3に入力されるが、加速度電位が一定値以下の「小」の場合には報知手段7により報知する。そして、加速度電位が一定値以上の「大」の場合には一定時間内における振動の数を判定し、例えば、0.5秒～2秒の間に続いて「大」の振動が発生していない場合には再測定になり、一方0.5秒～2秒の間に続いて「大」の振動が発生した場合には測定中断になり停止する。この測定中断の場合には加減圧機構5のバルブを開き、測定を停止するものである。

【0011】図5には本発明の更に他の実施例が示してある。この実施例においては、カフ帯1に加速度センサー2を内蔵すると共にカフ帯1上に表示手段15を設置してある。この表示手段15は血圧値、脈動値を表示する部分16と、体動検知を報知する手段13が設けてある。この体動検知を報知する手段13は例えば、文字により「動かないで」というような加速度センサー2で検知した体動を報知するようになっており、このようにに加速度センサー2で検知した体動を報知する部分が血圧値、脈動値の表示部分と同じ表示手段15において表示されるので、表示手段15を見ながら測定している間における体動を確認して、動かないように注意して正確な測定ができるものである。

【0012】

【発明の効果】本発明にあっては、上述のように、人体の要部をカフ帯により圧迫・阻血して動脈管及び動脈脈動を検出することで血圧を決定する血圧計において、カフ帯に体動を検知するための加速度センサーを設置し、加速度センサーにより検知した体動を報知する報知手段

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を設けたので、体動に伴う腕の小さな振動やゆっくりとした腕の上下が発生したことを加速度センサーにより検知して報知手段により報知でき、この結果、これらの体動を確認できないまま不正確な血圧測定を行うのを防止することができるものである。

【0013】また、体動検知により検知された体動変位量に応じて血圧測定を中断または再測定する手段を設けるものにおいては、体動による不正確な血圧測定を無くし、再測定又は不正確な測定の中断ができ、この結果、正確な血圧測定を行うことができるものである。また、カフ帯に表示手段を設置し、血圧値、脈動値に加えて体動検知を報知する手段を設けると、体動があった場合に、それを報知する部分が血圧値、脈動値の表示部分であるため、測定中における体動を確認しやすく、正確な測定がしやすいものである。

【図面の簡単な説明】

【図1】本発明のブロック図である。

【図2】同上に用いる加速度センサーの一例を示す断面図である。

【図3】同上に用いる加速度センサーの他例を示す断面図である。

【図4】本発明の他の実施例のフロー図である。

【図5】本発明の更に他の実施例の斜視図である。

【図6】体動を説明する説明図である。

【図7】カフ圧力の変動を示すグラフである。

【符号の説明】

1 カフ帯

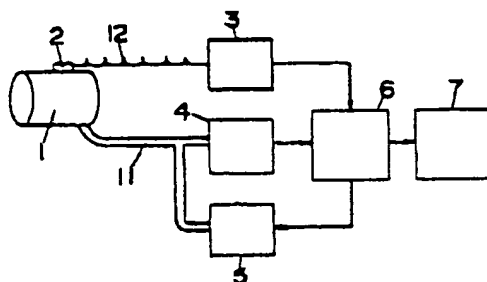
2 加速度センサー

7 報知手段

13 体動検知を報知する手段

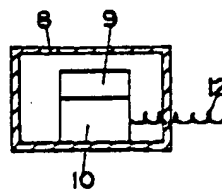
15 表示手段

【図1】

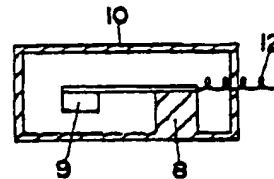


1 カフ帯
2 加速度センサー
7 報知手段

【図2】



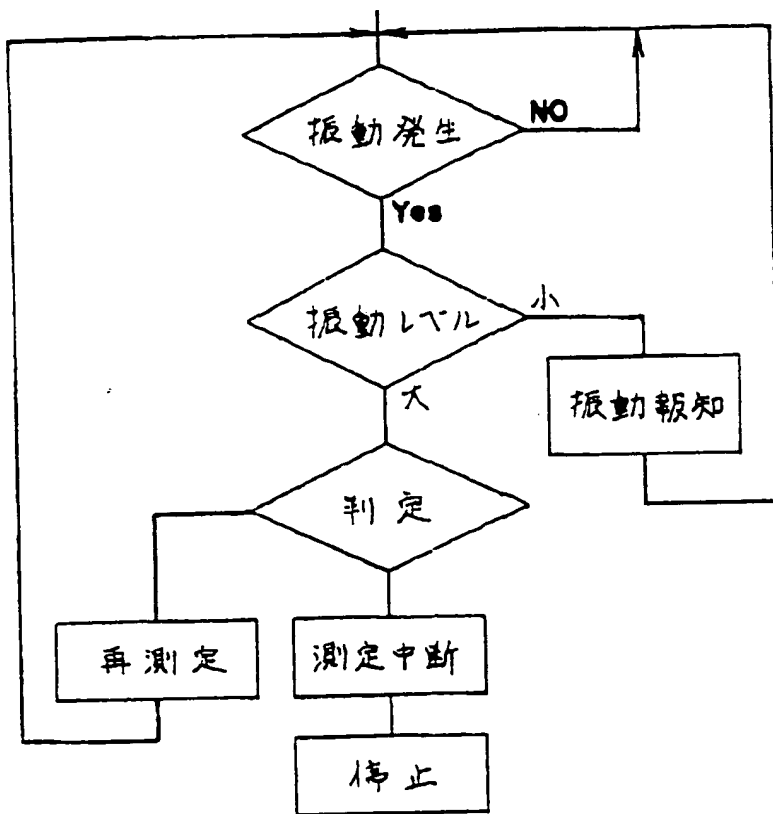
【図3】



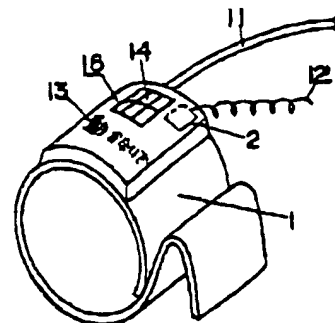
(4)

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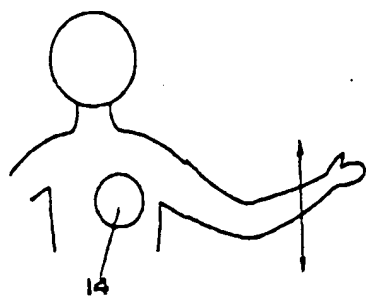
【図4】



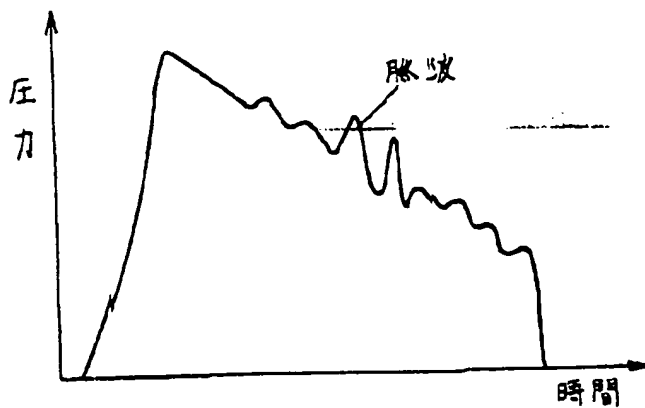
【図5】



【図6】



【図7】



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PAT-NO: JP405200004A
DOCUMENT-IDENTIFIER: JP 05200004 A
TITLE: HEMADYNAMOMETER

PUBN-DATE: August 10, 1993

INVENTOR-INFORMATION:

NAME
TERADA, HARUHIRO

ASSIGNEE-INFORMATION:

NAME	COUNTRY
MATSUSHITA ELECTRIC WORKS LTD	N/A

APPL-NO: JP04012501
APPL-DATE: January 28, 1992

INT-CL_(IPC): A61B005/022; A61B005/11
US-CL-CURRENT: 600/486,600/490

ABSTRACT:

PURPOSE: To detect and inform the occurrence of small vibrations of an arm accompanying body motion and the vertical slow motion of the arm.

CONSTITUTION: Blood pressure is determined by applying constriction and blood blocking with a cuff band 1 to principal parts of a human body to detect an artery sound and pulsation. Also, the cuff band 1 is provided with an acceleration sensor 2 for detecting body motion. An informing means 7 for informing the body motion detected by the acceleration sensor 2 is provided. The body motion is detected by the acceleration sensor 2 and informed by the informing means 7.

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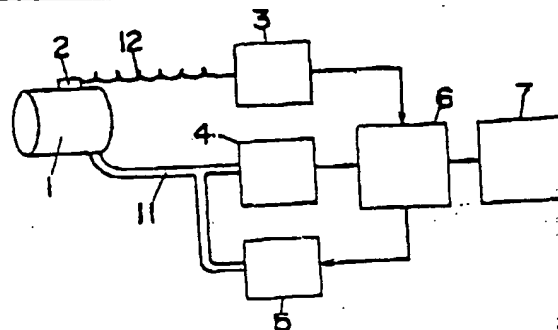
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(54) Title of the invention: Hemodynamometer

(57) [Abstract]

[Purpose] Notification in the event that small vibrations of the arm, accompanying body movement, and slow upward and downward movements of the arm occur.

[Composition] This is a hemodynamometer that determines blood pressure, by detecting arterial sound and pulsation of the artery, by constricting and obstructing the blood of the main parts of the body with a cuff band (1). The cuff band (1) is provided with an acceleration sensor (2) for notification of body movement. Notification device (7) that indicates the body movement, detected by the acceleration sensor (2) has been provided. Body movement is detected by the acceleration sensor (2), and notification of body movement is provided by the notification device.



[Diagram]

- 1. Cuff band
- 2. Acceleration sensor
- 7. Notification device

[Scope of patent claims]

[Claim 1] Hemodynamometer, which determines the blood pressure, by detecting arterial sound and pulsation of the artery, by constricting and obstructing the blood of the main parts of the body with a cuff band, characterized by the fact that it is composed of an acceleration sensor for detecting body movement, at the cuff band, and a notification device, which provides notification of body movement, detected by the acceleration sensor.

[Claim 2] The hemodynamometer, recorded in Claim 1, characterized by the fact that it is composed of a device, which suspends or remeasures the blood pressure measurement, in accordance with the amount of displacement, due to body movement, detected by body movement.

[Claim 3] The hemodynamometer, recorded in Claim 1, characterized by the fact that it is composed of a display device on the cuff band, and by providing a device, which indicates body movement detection, in addition to the blood pressure value, and the pulse value.

[Detailed explanation of the invention]**[0001]**

[Field of industrial application] The present invention relates to body movement detection by a hemodynamometer.

[0002]**[Prior art]**

In the case of conventional hemodynamometers, in the event that there were cuff pressure changes accompanying body movement, in particular, a large movement of the arm, as shown in Diagram 7, the fluctuation of the cuff pressure was determined to be abnormal, so notification was provided of the abnormality during blood pressure measurement, and the measurement was interrupted. However, in the event of a comparatively small body movement, there were times when measurement errors arose, since the changes in cuff pressure were small. In addition, as shown in Diagram 6, even in cases where there was a comparatively slow upward and downward movement of the arm, it was not possible to provide notification of abnormalities, since the changes in cuff pressure were small. In addition, since a difference arose in the height, of the arm and the heart (14), due to the upward and downward movement of the arm, the blood pressure of the arm becomes different from the blood pressure of the heart, due to the hydrocephalic pressure difference.

[0003]**[Problems that the invention attempts to solve]**

As noted above, previously when small vibrations of the arm accompanying body movement, or slow upward and downward movements of the arm occurred, there were no means for detecting this with a conventional hemodynamometer. The present invention was based on the above-mentioned problems, with the conventional art, and its purpose lies in the provision of a hemodynamometer, which can provide notification, by detecting instances, where small vibrations of the arm accompanying body movement, or slow upward and downward movements of the arm occur, and, in addition, can perform accurate blood pressure measurement.

[0004]

[Means for solving the problems] In order to solve the problems of the prior art, noted above, and attain the purposes of the present invention, the hemodynamometer is characterized by the fact that, being a hemodynamometer that determines blood pressure, by detecting arterial sound and pulsation of the artery, by constricting and obstructing the blood of the main parts of the body with a cuff band (1), it is composed of an acceleration sensor (2) for detecting body movement at the cuff band (1), and a notification device (7), which indicates body movement, detected by the acceleration sensor (2).

[0005]

In addition, it is preferable to provide a device that suspends or remeasures the blood pressure measurement, in accordance with the amount of displacement, due to body movement detection. Moreover, it is preferable to provide a display device (15) on the cuff band, and to provide a method (13) that indicates body movement detection, in addition to the blood pressure value, and the pulse value.

[0006]

[Action] According to the present invention, as noted above, by providing an acceleration sensor (2) on the cuff band (1), for detecting body movement, and by providing a notification device (7), which indicates body movement, detected by the acceleration sensor (2), even when small vibrations of the arm, accompanying body movement, or slow upward and downward movements of the arm occur, this is detected by the acceleration sensor (2), and notification is provided by the notification device (7), and, due to this, it becomes possible to confirm the fact that small vibrations of the arm, accompanying body movement, or slow upward and downward movements of the arm have occurred, and, in addition, it becomes possible to prevent the carrying out of inaccurate blood pressure measurement, which occurs when it is not possible to confirm these movements.

[0007]

In addition, when a method for suspending the blood pressure measurement, or remeasuring, in accordance with the amount of displacement of body movement detection is provided, it becomes possible to eliminate inaccurate blood pressure measurements, due to body movement, and it becomes possible to carry out remeasurement, or to suspend inaccurate measurement. In addition, when a display device (15) is provided on the cuff band (1), and a device (13) that provides notification of body movement detection, in addition to the blood pressure value, and the pulse value, is provided, in those cases where there is body movement, the part that provides notification of this is the display part for the blood pressure value and the pulse value, so, confirmation of body movement during measurement, and accurate measurement become easy.

[0008]

[Working example] Below is a detailed description of the present invention, based on the working examples shown in the attached diagrams. Diagram 1 is a block diagram, showing one working example of the present invention. The hemodynamometer, which constitutes the present invention, has been configured, so that it determines blood pressure, by detecting arterial sound and pulsation of the artery, by constricting and obstructing the blood of the main parts of the body with a cuff band (1). An acceleration sensor (2), for detecting body movement, has been provided on the cuff band (1), and it is

configured, so that it performs voltage conversion with an amp (3), and inputs this with a control part (6). In addition, it is configured, so that it provides notification, by controlling the notification device (7), (for example, a buzzer) from the control part (6), in accordance with the amount of acceleration. In diagram 1, (11) is an air pipe, (4) is a voltage conversion circuit, and (5) is a cuff band adjustable pressure mechanism.

[0009]

An example of the acceleration sensor (2) has been shown in diagram 2 and diagram 3, a pile (9) and a piezoelectric element (10) have been provided inside the **[illegible; perhaps "body frame" ?]**; the item shown in diagram 2 is an item, where the pile (9) is arranged on top of the piezoelectric element (10); the item shown in diagram 3 is where the pile (9) is arranged at the tip of a plate-shaped piezoelectric element (10); and the device is configured, so that acceleration electric potential is generated on the cable (12), owing to the compression and expansion of the piezoelectric element (10), as shown in diagram 2, and the bending of the piezoelectric element (10), as shown in diagram 3. The speed and displacement carry out primary and secondary integration of the acceleration, respectively, and, in addition to its being convertible, it is also possible to observe body movement by acceleration only.

[0010]

Another working example of the present invention has been shown in diagram 4. In this working example, as shown in the flow chart in diagram 4, the device is configured, so that notification is provided by vibrations, in accordance with the vibration level (acceleration), at the time the vibration occurs, remeasurement is performed in the event that the vibration level is high, and a judgment of measurement suspension is made. In other words, in diagram 3 and diagram 4 body movement is detected by the acceleration sensor (2); in the event that vibrations, due to body movement, occur, the acceleration electric potential, detected by the acceleration sensor (2), is inputted to the control part (3) through the amp (3); in the event that the acceleration electric potential is "small", below a fixed value, notification is provided by the notification device (7). Then, in the event that the acceleration electric potential is "large", above a fixed value, the number of vibrations, in a fixed period, is determined. For example, in the event that "large" vibrations have not occurred continuously for 0.5 seconds ~ 2 seconds, remeasurement is carried out, while in the event that "large" vibrations occur continuously for 0.5 seconds ~ 2 seconds the measurement ends up being suspended, and the procedure is stopped. In the cases of such a measurement suspension, the valve of the acceleration mechanism (5) opens, and the measurement stops.

[0011]

Another working example of the present invention has been shown in diagram 5. In this working example, the acceleration sensor (2) has been built into the cuff band (1), and, in addition, a display device (15) has been provided on the cuff band (1). A part (16)* that displays the blood pressure value, the pulse value, and the device (13) for providing notification of the body movement detection, have been provided for this display (15). The device (13) for providing notification of this body movement detection is configured, so that it provides notification of body movement, detected by the acceleration sensor (2). For example, the display message "Do not move", since the part that provides notification of the body movement, detected, in this manner, by the acceleration sensor (2), is displayed on the same display (5) as the display part for the blood pressure value, and pulse value. It is possible to confirm

*Item (16) does not appear in the diagram provided.

body movement in the time period, in which one is carrying out measurements, as one observes the display device (15), and, thus, it becomes possible to accurately measure, by paying attention, so that the subject does not move.

[0012]

[Effects of the invention] In the present invention, as described above, in a hemodynamometer, which determines the blood pressure, by detecting arterial sound and pulsation of the artery, by constricting and obstructing the blood of the main parts of the body with a cuff band, an acceleration sensor, for detecting body movement at the cuff band, is provided, and a notification device, which provides notification of body movement, detected by the acceleration sensor, is provided, so, as a result, it becomes possible to detect that small vibrations of the arm, accompanying body movement, or slow upward and downward movements of the arm, have occurred, by means of the acceleration sensor, and to provide notification, so it becomes possible to prevent the carrying out of inaccurate blood pressure measurement, which happens when it is not possible to confirm these movements.

[0013]

In addition, in an item where a method for suspending the blood pressure measurement, or remeasuring in accordance with the amount of displacement of body movement detection is provided, it becomes possible to eliminate inaccurate blood pressure measurements, due to body movement, and it becomes possible to remeasure, or to suspend inaccurate measurement. As a result, it is possible to perform accurate blood pressure measurement. In addition, when a display device is provided on the cuff band, and a device, which provides notification of body movement detection, besides the blood pressure value, and the pulse value, in those cases, where there is body movement, the part that provides notification of this is the display part for the blood pressure value and the pulse value, so, confirmation of body movement during measurement, and accurate measurement, become easy.

[Brief explanation of diagrams]

[Diagram 1]

This is a block diagram of the present invention.

[Diagram 2]

This is a cross section diagram, showing one example of the acceleration sensor, used in the device shown in diagram 1.

[Diagram 3]

This is a cross section diagram, showing another example of the acceleration sensor, used in the device shown in diagram 1.

[Diagram 4]

This is a flow diagram of another working example of the present invention.

[Diagram 5]

This is an oblique view of yet another working example of the present invention.

[Diagram 6]

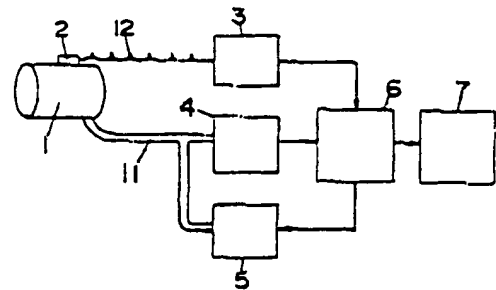
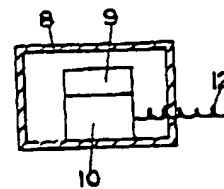
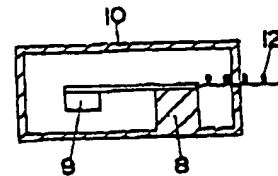
This is an explanatory diagram, which describes body movement.

[Diagram 7]

This is a graph, showing the fluctuations of cuff pressure.

[Key]

- 1. Cuff band
- 2. Acceleration sensor
- 7. Notification device
- 13. Device for notification of body movement detection
- 15. Display device

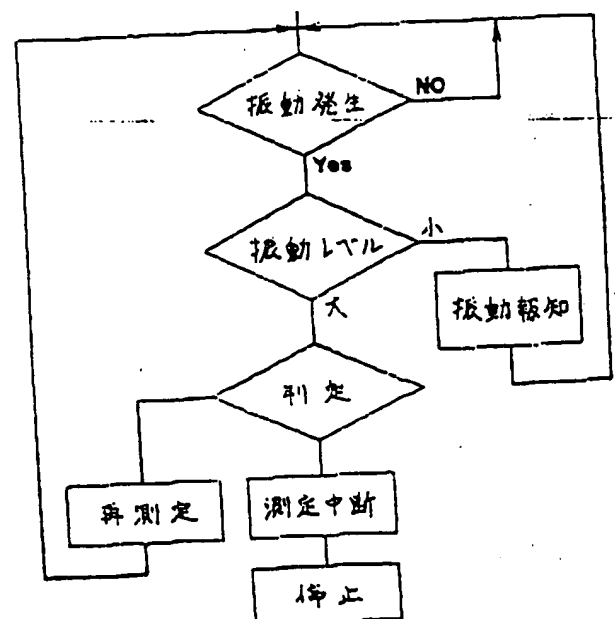
[図1]**[図2]****[図3]****[Diagram 2]**

- 1. Cuff band
- 2. Acceleration sensor
- 7. Notification device

[Diagram 3]**[図4]****[Diagram 4]**

[Flow chart, top to bottom]

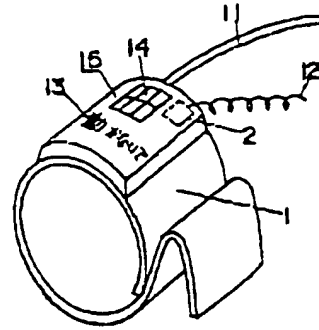
- | | |
|-----------------------|---------------------------|
| [Diamond 1] | Occurrence of vibration |
| [Diamond 2] | Vibration level |
| [Line to right] | Small |
| [Box at right] | Notification of vibration |
| [Downward line] | Large |
| [Diamond 3] | Determination |
| [Box at lower left] | Remeasurement |
| [Box below diamond 3] | Measurement suspended |
| [Box, bottom center] | Stop |



【圖5】

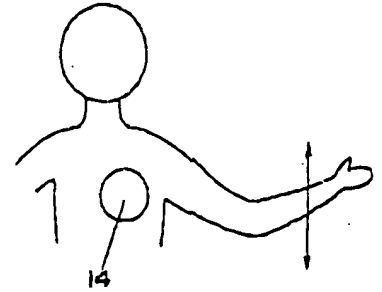
[Diagram 5]

13. "Do not move"



[Diagram 6]

【圖6】



[Diagram 7]

[x axis]

[y axis]

[Indication in graph]

Time

Pressure

Pulse wave

【圖7】

